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in former years the export was considerably greater than it is now.

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### AGE OF TROTTING HORSE SIREs

THEORIES of heredity deduced from statistics always require critical examination. Statistics of heredity, like those of other subjects, offer striking possibilities to searchers for support of preconceived theories. I have recently completed some work with the trotting horse records, the result of which may be of interest inasmuch as it does not corroborate the results of other work in the same field.

Mr. C. L. Redfield has recently published a dynamic theory of development based largely on the statistics of the age of sires of average and of preeminent trotting horses. He assumes that by exercise a horse acquires "dynamic development," which facilitates speed and is transmitted. Dynamic development will naturally be greater in old than in young horses; in horses that are campaigned than in those not prepared for racing. Other things being equal, an old stallions' colts would inherit greater dynamic development and be faster than other colts sired by the same horse while younger. He found that the average trotting-bred horses, represented by the first one thousand animals listed in the Index Digest, were sired by stallions at an average age of 9.43 years. Representing the superior trotting horses by the 2.10 list, he based his calculations on the males appearing in four generations of each pedigree. The average time between generations in the male line in this instance was found to be 14 years; the sires were therefore practically 13 years old at the time of service. The difference between 9.43 and 13 years as the ages of sires of average and 2.10 horses is a very striking one and forms the basis of argument for the transmission of the dynamic development attributable to advanced age.

The matter of inheritance of dynamic development produced by racing, I propose to discuss at another time.

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The following is from Mr. C. L. Redfield's recapitulation of his theory published in the *Horse World*, issue of February 27, 1906:

I said that I took one thousand registered stallions, alphabetically, from the *Index Digest* of the Register, and calculated the ages of their sires at the time when these registered stallions were foaled. From these I determined that the average time between generations in the male line was 10.43 years, which would give the average age of sires as 9.43 years at the time of service. I then said that, making all reasonable allowances for errors, the average time between generations in the male line might be set down as between 10 and 11 years, and that this period might be used as a standard in testing the age part of the theory. So far no one claims to have tested the accuracy of my calculation; no one claims that the figures I gave were wrong; and no one has said that these figures can not properly be used as a standard; yet if I am to be controverted, one of the first things to be done is to dispute the accuracy of my standard.

I then took the entire list of 2.10 trotters as an appropriate class of animals to be used in testing the inheritance of dynamic development, and I calculated the ages of their male progenitors for four generations. The number of animals involved was over five thousand and I gave the average time between generations in the male line for the production of 2.10 trotters as being approximately 14.00 years. This is an average of nearly 40 per cent. over the standard average determined from the Register, and my explanation of this remarkable difference was that it indicated the inheritance of acquired dynamic development. So far no one has disputed the accuracy of my computation and no one has attempted to give any other explanation of such an unusual divergence from the natural order of things.

Am I right or am I wrong? If I am wrong will some one please come forward with a better explanation.

It is to be noted that in the case of the average horses represented by the first thousand in the *Index Digest*, the ages of their *immediate* sires only were computed, and found to average 9.43 years; whereas in the case of the horses in the 2.10 list *all the sires appearing in the first four generations* were brought in. Assuming 14 years to be correct for the average time between generations, this carries us back 56 years.

The first horse that was uniformly successful as a sire of speed was Hambletonian 10 foaled in 1849. In the sixties this horse's reputation as a sire of speed was established and he did heavy stud service until the time of his death in 1873.

This was the real beginning of the trotting breed of horses. During the later years of the life of Hambletonian 10 and subsequent to his death his sons were patronized by owners of well-bred and speedy mares. The more successful of these sons naturally received heavy stud patronage as long as they remained serviceable. When the grandsons of Hambletonian 10, with two generations of speed-producing sires back of them and out of selected female ancestry, came into service, it was found that in many instances they sired faster colts than did their sires or grand sire. Only in more recent years were representatives of popular families used for stud purposes in earlier life.

In view of these facts, I deem it unfair to base a conclusion upon a comparison of two results, one of which (13 years as the average age at time of service of sires in four generations back of horses in the 2.10 list) comes largely from an investigation of the formative period of the breed, while the other (9.43 years as the average age at time of service of immediate sires of average horses) mainly refers to more recent conditions.

If the figures 9.43 and 13.00 had been derived by similar means their value would be unquestionable. A really fair comparison would demand the same procedure in one case as in the other. Either all sires in the four generations of the thousand horses should be used or else only the immediate sires of those in the 2.10 list.

Assuming 9.43 to be correct for the average age of the sires when they produced the first one thousand horses in the *Index Digest*, I have attempted to secure a similar figure for the immediate sires of the horses in the 2.10 trotting list as published in "Yearbook," Volume 22. The list published in that volume contains 279 horses. In thirty cases the records failed to show the horse's age. In seven cases the age of the sire is not given. This leaves 242 of the 279 in the list for which the ages are shown.

Below are given two extremes and the average for 242 horses regarding which there exists no uncertainty:

Horse	Foaled	Sire	Sire foaled	Age of Sire at Time of Service
Wentworth 2.04½	1903	Superior	1879	23.
Dolly Dillon 2.06½	1895	Sidney Dillon	1892	2.
Average for 242 horses				9.41

Of the 242 horses,

1 was sired by	2 year old stallion
11 were sired by	3 year old stallions
17 were sired by	4 year old stallions
30 were sired by	5 year old stallions
19 were sired by	6 year old stallions
21 were sired by	7 year old stallions
21 were sired by	8 year old stallions
25 were sired by	9 year old stallions
14 were sired by	10 year old stallions
17 were sired by	11 year old stallions
8 were sired by	12 year old stallions
13 were sired by	13 year old stallions
8 were sired by	14 year old stallions
9 were sired by	15 year old stallions
6 were sired by	16 year old stallions
6 were sired by	17 year old stallions
1 was sired by	18 year old stallion
4 were sired by	19 year old stallions
3 were sired by	20 year old stallions
0 were sired by	21 year old stallions
6 were sired by	22 year old stallions
2 were sired by	23 year old stallions

Taking 9.43 years as the average age of sires of average horses and substituting 14 by 9.41 years as the average age of sires of 2.10 trotting horses, it is evident that the records do not reveal any superiority of the old sire over the younger one.

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## THE OCCURRENCE OF BATRACHOCEPS ATTENUATUS AND AUTODAX LUGUBRIS IN SOUTHERN CALIFORNIA

RECENTLY the salamander *Autodax lugubris* has been found near Los Angeles, Cal.<sup>1</sup> So far as I know, until this animal was reported no salamanders were known to live in southern California out from the mountains, although in the mountains and cañons of the foothills here and there as far as San Diego, another characteristic Pacific-coast salamander, *Diemyctylus*

<sup>1</sup> Miller, L. H., AM. NAT., Vol. XL, pp. 741-742.